

REMARKS

Claims 1-6, 8-29 and 31-44 are pending in the subject application.

Claims 7 and 30 have been cancelled without prejudice.

Claims 1-6, 8-29 and 31-44 stand rejected.

Rejections under 35 U.S.C. § 103(a)

1. Claims 1-10, 19, 22, 24-26 and 42-44

In paragraph 2 of the Action, Claims 1-10, 19, 22, 24-26 and 42-44 stand improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg. Claim 7 has been cancelled without prejudice. It appears that the Office has misunderstood the teachings of Johnson and Adlersberg, and Applicant requests withdrawal of the § 103(a) rejection. Claim 1 has been amended to clarify the detection of voice activity in the claimed subject matter.

In order for the Office to establish a *prima facie* case for obviousness, three (3) criteria must be met. First, there must be some suggestion or motivation, either in the cited prior art references or in the knowledge generally available to those of ordinary skill in the art, to modify the primary reference as the Office proposes. Second, there must be a reasonable expectation of success in connection with the Office's proposed combination of the references. Third, the prior art references must disclose or suggest all of the claimed limitations. *See* MPEP 2143. The Office has failed to establish a *prima facie* case for obviousness because the Office to satisfy its burden of showing that the prior art discloses or suggests all of the claimed elements of Claims 1-6, 8-10, 19, 22, 24-26 and 42-44 and, as such, failed to satisfy his burden of showing that there is a

suggestion or motivation to one of ordinary skill in the art to modify the primary reference as the Office proposes.

Claim 1, as amended, is instructive in this instance and recites in part:

- (a) applying a windowed Fourier transformation to said signal frames;
- (b) approximating signal magnitudes of said signal frames;
- (c) **computing Signal-to-Noise Ratio magnitudes of said signal frames;**
- (d) **detecting voice activity in said channel as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds;**
- (e) detecting noise activity in said channel;
- (f) estimating gain in said signal frames;
- (g) **applying an estimated noise history to said signal frames to compute a spectral gain function;**
- (h) applying said spectral gain function to the components of said windowed Fourier transformation; and,
- (i) applying an inverse Fourier transform to said signal frames thereby reconstructing a noise reduced output signal frame. (emphasis supplied)

In contrast, Johnson teaches a noise suppression device that receives an input signal and generates a series of data frames. *See* Johnson 6:21-27. The frames are passed through a series of filters to remove the DC component (*Id.* at 6:33-44) and a window is applied to the filtered frames. An FFT is applied to the windowed signal to produce 321 sets of a magnitude component and a phase component of the received frequency spectrum. *Id.* at 7:10-14, 7:20-25. A Voice Activity Detector (VAD) receives the components and detects the presence of a speech component in a noise corrupted signal by measuring the energy and frequency content of a data frame of samples. The VAD utilizes flags, PDF and SDF, to define the state of the data frame of samples. Depending upon the value of the respective flag, “1” or “0”, the frame will be defined as “Silence”,

“Primary Detect”, “Speech” and “Hangover”. *Id.* at 7:28-47. For example, when $PDF=0$, then the state of the frame is “Silence”. When $PDF=1$ for three consecutive frames, then a state transition from “Silence” to another state (i.e., speech, etc.) occurs. *Id.* at 7:57-8:39. See Figure 2.

Johnson then computes estimated noise energy as a function of an average noise value (*Id.* at 8:46-65) and calculates gain values based on smoothed frequency components and the state of the speech signal outputted from the VAD. *Id.* at 13:26-36. The estimated noise energy is integrated with past values of noise energy to produce a spectrum of noise in the frame. *Id.* at 14:1-21. The smoothed gain values are applied to the raw magnitude components of the speech signal and the raw magnitude components are combined with the original phase components to produce a noise reduced FFT frame. This noise reduced FFT frame is then provided to an inverse FFT module to convert the FFT frame to a noise suppressed frame in the time domain. *Id.* at 15:21-32.

While the Office admits, and Applicant agrees, that Johnson fails to teach applying an estimated noise history to signal frames to computer a spectral gain function, it is also apparent that Johnson fails to teach computing SNR magnitudes of the signal frames, and detecting voice activity as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds. For example, the portion of Johnson cited for the teaching of SNR, Col. 1, lines 55-60, describes spectral subtraction and how spectral subtraction utilizes SNR to determine gain for a frequency component of a signal. The gain values computed in Johnson, however, are based on smoothed

frequency components and the state output of the VAD. Thus, there is no need in Johnson for SNR and the Office's reliance upon Johnson in this instance is misplaced.

Further, Johnson fails to teach detecting voice activity as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds. Rather, the VAD of Johnson simply detects the energy of a data frame of samples and defines the state of the data frame as a function of two flags, PDF and SDF. This state output is then utilized to calculate gain values. *Id.* at 13:26-36. Such a teaching is contrary to the claimed subject matter and cannot provide *prima facie* support for the claimed element of "detecting voice activity as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds." As it is clear that the primary reference fails to teach, suggest or disclose applying an estimated noise history to signal frames to computer a spectral gain function, computing SNR magnitudes of the signal frames, and detecting voice activity as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds, and the Office has not alleged that Adlersburg teaches or suggests each of these elements, Applicant hereby respectfully requests that the Office reconsider and withdraw the § 103(a) rejection of independent Claim 1.

Claims 2-6, 8-10, 19 and 22, Claims 24-26, and Claims 42-44 are dependent upon independent Claims 1, 23 and 35. "If an independent claim is non-obvious under 35 U.S.C. § 103, then any claim depending therefrom is non-obvious." *See* MPEP 2143.03. Therefore, without addressing the additional patentable elements thereof, Applicant

respectfully requests that the Office withdraw the § 103 rejection of Claims 2-6, 8-10, 19, 22, 24-26, and 42-44.

2. Claims 20, 21, 23, and 34-42

In paragraph 3 of the Action, Claims 20, 21, 23 and 34-42 stand improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg and Sluijter. Independent Claims 23 and 35 have been amended to include the element of “identifying speech segments from said noise component as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds.” Incorporating the discussion in paragraph one above, neither the primary reference Johnson nor the art of record teaches, suggests or discloses this element. Reconsideration and withdrawal of the rejection of independent Claims 23 and 35 are respectfully requested.

Claims 20-21, Claim 34 and Claims 36-42 are dependent upon independent Claims 1, 28 and 35, respectively. Claims 1, 28 and 35 are in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claims 20-21, 34 and 36-42.

3. Claim 27

In paragraph 4 of the Action, Claim 27 stands improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg and Hermansky. Claim 27 is dependent upon independent Claim 23. Claim 23 is in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements

thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claim 27.

4. Claims 11-15, 18 and 28-32

In paragraph 5 of the Action, Claims 11-15, 18 and 28-32 stand improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg, Bizjak and Hermansky. Claims 11-15 and 18 are dependent upon independent Claim 1. Claim 1 is in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claims 11-15.

Independent Claim 28 has been amended to include the element of “a voice activity detector...said voice activity detector detects and attacks noise activity on a frequency channel as a function of conditional comparisons of received Signal-to-Noise Ratios and average Signal-to-Noise Ratio thresholds.” Incorporating the discussion in paragraph one above, neither the primary reference Johnson nor the art of record teaches, suggests or discloses this element. Reconsideration and withdrawal of the rejection of independent Claim 28 is respectfully requested.

Claims 29 and 31-32 are dependent upon independent Claim 28. Claim 30 has been cancelled without prejudice. Claim 28 is in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claims 29 and 31-32.

5. Claims 16-17

In paragraph 6 of the Action, Claims 16 and 17 stand improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg, Sluijter, Bizjak and Hermansky. Claims 16 and 17 are dependent upon independent Claim 1. Claim 1 is in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claims 16 and 17.

6. Claim 33

In paragraph 7 of the Action, Claim 33 stands improperly rejected under 35 U.S.C. §103(a) as being unpatentable by Johnson in view of Adlersberg, Bizjak and Hermansky. Claim 33 is dependent upon independent Claim 28. Claim 28 is in condition for allowance. By virtue of dependency alone and without addressing the additional patentable elements thereof, Applicant respectfully requests that the Office reconsider and withdraw the § 103 rejection of Claim 33.

Conclusion

Applicant submits that the present application is in condition for allowance.

Allowance of Claims 1-6, 8-29 and 31-44 is hereby requested.

If the Examiner believes that an in-person or telephonic interview with the Applicant's representatives will expedite the prosecution of the subject patent application, the Examiner is invited to contact the undersigned agents of record.

Should any additional fees be necessary in connection with the filing of this paper, or if a petition for extension of time is required for timely acceptance of the same, such a petition is made and the Office is authorized to charge such fees to Deposit Account No. 04-1679.

Respectfully submitted,



Mark C. Comtois

Reg. No. 46,285

DUANE MORRIS LLP
1667 K Street, N.W., Suite 700
Washington, D.C. 20006
Telephone: (202) 776-7800
Telecopier: (202) 776-7801

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